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Empowering teachers and learners: Strategies to maximise curriculum potential and counter disadvantage in KwaZulu-Natal, South Africa, through the Khanyisa initiative

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Empowering teachers and learners: Strategies to maximise curriculum potential and counter disadvantage in KwaZulu-Natal, South Africa, through the Khanyisa initiative

Marguerite Maher and Julie-Anne Seach

Abstract

THIS PAPER FIRST provides a discussion on disadvantage and what that means in an educational context. It then proposes a theoretical conceptualisation of curriculum highlighting that curriculum advantages some learners more than others on several levels. Finally, discussion then turns to an evaluative study of an initiative that is ongoing in KwaZulu-Natal, South Africa, involving disadvantaged learners and their teachers in under-resourced schools. Key findings from the study include effective ways the initiative found (a) to assist teachers in disadvantaged schools to keep abreast of changes to curriculum; (b) to empower teachers to promote their learners' capacity to access the physical science, higher level mathematics, and the business studies curriculum; and (c) to support learners to substantially increase their grades in what they term 'the killer subjects'. This paper has a strong focus on mathematics as it is here that there have been the most marked increases in learners' grades. These outcomes in turn have allowed learners to escape from the poverty trap and the disadvantage in which they had been situated.

Disadvantage in several guises

Meeting the Hydra

At present, there is debate over the thinking and skills focus of the 21st century and what is seen as the neglect of knowledge (Donnelly & Wiltshire, 2014). This comes at the same time as the search for new perspectives—in understanding how students learn, quality teaching practices, and the role that disadvantage plays in preventing students from rising above poverty. The evaluation of an initiative known as 'Khanyisa' (Lighting up learning) discussed in this paper, looked at ways to improve student outcomes in mathematics. It was conducted in the disadvantaged schools of the KwaZulu-Natal in South Africa. While the study itself was localised, it has strong implications for teacher expertise and the knowledge gained from the curriculum.

According to Bloch (Singh & Steyn, 2013), South African students not only perform poorly in international tests, but within South Africa more than half of students leave school

before matriculation and fewer than 12 per cent of black students go on to university. The under-resourced schools are frequently dealing with serious problems—students affected by family factors such as poverty, sickness, the loss of a parent through HIV/AIDS; environmental factors such as drug and alcohol abuse, gangsterism and violence; and school factors such as teen pregnancy and bullying (Singh & Steyn, 2013). In addition, a deficiency in the number of teachers studying mathematics and the ‘teacher-proofing’ of the curriculum has acted to de-professionalise teachers and resulted in a lack of curriculum content knowledge as well as pedagogic skills (Msibi & Mchunu, 2013). The interweaving issues of disadvantage, social justice and inequality come into play here, because to be disadvantaged, or advantaged, is to be affected by a complex raft of factors that contribute to the health, wellbeing and dignity of communities and the individuals within them, and the failure to thrive is often not a choice.

Disadvantage, and advantage, can be defined in absolute or relative terms that are linked to levels of: (a) poverty, which may be broadly described as an income inadequate to provide necessities such as adequate food or shelter; (b) deprivation, through a lack of the resources considered essential to maintain the minimum acceptable standard of living in one’s society; and (c) social exclusion through the inability to participate (Montoya, 2014). Within these domains are issues of health, safety and welfare which impact a person’s living standards. These form a deeper picture of what it actually means for a person to be disadvantaged or advantaged.

Understanding the theories, practices and attitudes behind the realities faced by disadvantaged individuals can help to overcome disadvantage (Healy & Powell, 2013). However, an academic paper can seldom capture the depth and breadth of disadvantage. When seen through the lens of post-apartheid South African schools, for example, Nussbaum’s (2000) capabilities approach to defining disadvantage highlights the problems faced in the everyday lives of many students and their teachers. These capabilities include the capability of living a life that is not prematurely cut short; the ability to have bodily health and integrity; the ability to think, reason, imagine and express; to not be ruled by fear or anxiety; to plan for one’s own good; to live as a social being and show concern for others; to live in relation to the natural world; to laugh and play; and to participate in political processes that influence

one’s own life. Consider again the issues faced by a student who faces the burdens of poverty, a home-life disrupted by sickness or the threat of violence from gangs, as well as well as bullying. Survival becomes a much greater focus than seemingly irrelevant school lessons. Unfortunately the educational response often extends inequity through a lack of curricular justice to the most disadvantaged students (Connell, 2012).

Clearly it is not possible to give one simple, immediate solution to such a complex problem, since the factors which affect disadvantage can arise through any number of circumstances but may also span generations. While some solutions to disadvantage—such as access to health care or unemployment benefits—have an immediate impact, others may require significant time before results can be seen.

Poverty, deprivation and exclusion are often all-encompassing problems, affecting thoughts and emotions, immediate and long-term health, and wellbeing now and in the future. In this, disadvantage is like the many-headed serpent, the Hydra, which Hercules faced in his second labour. If one head was cut off, two grew in its place. It was only when all the heads of the Hydra were cut off that the monster was finally slain. It is essential, therefore, to tackle disadvantage from every perspective. In this paper, findings from a study which took place in KwaZulu-Natal will highlight the issue of disadvantage and education and will be addressed through the lens of curriculum and the current socio-political moment within which the study took place.

Educational disadvantage

The frequently perceived role of education is to provide opportunities for students to fulfil their potential. However, far from doing this, education can be a formidable force driving social selection (Connell, 1993). Socioeconomic status (SES) can affect end of school results significantly, creating disparity in education between high and low SES students (Organisation for Economic Co-operation and Development [OECD], 2013). Some countries, however, are able to narrow the achievement gap better than others, with students showing a resilience that allows them to perform better than SES would suggest. For example, the French solution to the problem of disparity in mathematics achievement—by developing the mathematic skills and problem-solving abilities of early school learners—has

met with success in the international Trends in International Mathematics and Science Study tests (Fowler & Poetter, 2004).

Disadvantaged learners and learning: Teacher efficacy

Success in learning is influenced by a range of complex, intersecting factors that extend beyond the broad categories of demographics. Some teaching practices, for example, suit students better than others, and teachers' attitudes can affect their students' motivation. These teaching practices and attitudes can in turn be affected by factors such as school size, teacher qualification and SES (Webster & Fisher, 2003).

Some theories endeavour to explain why educational achievement among students varies according to socioeconomic background, emphasising home life as a factor. For example, language deficit theory contends that students from lower SES backgrounds are disadvantaged compared to their middle-class peers (Aliakbari & Jamalvandi, 2010). Another is that students whose home language is different from the language of instruction will be disadvantaged. In South Africa, "...households are characterised by a lack of learning materials and educational toys, [and] high rates of parental illiteracy" (Vally, 2012, p. 624). Specifically, it should be noted that "poverty remains race bound with the vast majority of poverty existing amongst black South Africans" (Collins & Millard, 2013, p. 70). Education in South Africa does not adequately take cognisance of the needs of the country, specifically in relation to disadvantaged youth (Favish & Hendry, 2010). These views are supported by the OECD (2013) findings on SES linking to achievement, specifically in mathematics and physical science.

Research consistently finds that teacher expectations of their students' higher-order cognitive skills are often linked to SES factors, affecting the type of curriculum instruction given (Torff, 2014). In other words, while the written curriculum may endeavour to reduce disadvantage and champion social justice and equity, the enacted curriculum may, in fact, preserve social barriers.

Hattie's (2012) work, where he extrapolated the data from hundreds of studies including thousands of children, concludes that by attributing the lack of student success to external factors such as poverty, educators often develop deficit thinking where they believe that they cannot change the lives of their

students. However, Hattie's work demonstrated that what teachers do in the classroom can and does lead to improved outcomes for students. Key findings of the current study harmonise with Hattie's (2012) views and are discussed later.

Disadvantaged learners and learning: The mathematics curriculum

In a number of countries, the study of mathematics at an advanced level is declining and the number of students studying mathematics at university is decreasing, with proportionally fewer students at school and university studying science, engineering and technology (Commonwealth Scientific and Industrial Research Organisation, 2008). This was the case in the context of the current study where curriculum changes saw increased numbers of high school students selecting lower level mathematics that did not lead to the study of mathematics at tertiary level.

This naturally has some significant implications. A student's performance in secondary school leaving examinations has direct bearing upon their pathways after school, including work prospects and access to tertiary education (Fowler & Poetter, 2004). A decline in the number of students studying mathematics at university in general, and lower numbers of women in particular, would be expected to correspond with a decline in the number of those able to teach mathematics, and a vicious circle created with ever decreasing numbers studying mathematics, adversely affecting stores of knowledge, science, business, agriculture and industry.

As discussed, a number of factors influence learning success. Specifically in relation to mathematics and science, Kelly (2007) found that students with weaker skills were less likely to be engaged, thus setting the stage for a cycle of reduced achievement. Students' interest in mathematics is also influenced by their fear of failure, their self-efficacy beliefs and their mastery goals. Additionally, students' confidence and their disposition toward mathematics may be influenced by the learning environment they encounter, with teacher expertise also linked to student mathematics achievement (Mistretta, 2004).

Demographics do influence students' academic success. One of the difficulties disadvantaged students face is that when education is culturally bound to particular values and behaviours, any child outside those normative values faces a culture clash that can impede their personal success within 'the system'

(Vally, 2012). Since certain practices are embedded within culture, some practices within schools privilege and empower some students, while creating barriers for others (Sharp, 2012). This forms a part of the hidden curriculum which emphasises the rules, norms and characteristics a student is expected to acquire in order to succeed (Anyon, 1980). If a disadvantaged student's habitus is not aligned with that of their educational setting, the barriers they face may be an additional source of disadvantage.

Jorgensen and Niesche (2008) indicated that practices in the teaching of mathematics acknowledge and value some aspects of culture while denying others. For example, the cultural mores which differ in the interactions between mother and child in lower-class and middle-class homes are reflected in textbooks and classroom practices (Cooper & Dunne, 1999; Cooper & Harries, 2005). Often, mathematics is given a linear, more superficial treatment for students who are seen to have lower ability, rather than deep, rich learning that connects topics both within and beyond mathematics, thus generating a complex schema of thought. Visible pedagogy, through the use of explicit teaching, and discussion of mathematical concepts rather than the completion of practice exercises have been shown to improve the learning of disadvantaged students (Fowler & Poetter, 2004). The enacted curriculum is, therefore, an element of equity in education, as the type of thinking and conceptual understanding students encounter have the potential to transfer them from a position of meeting targeted basic skills to the realms of mathematics and higher order thinking.

A significant, positive relationship between teachers' mathematical knowledge and student achievement has been found (Hill, Rowan & Ball, 2005). Teacher effectiveness is linked to their knowledge of content matter and to their understanding of the concepts they teach (Stevens, Aguirre-Munoz, Harris, Higgins & Liu, 2013). Teachers with deeper understanding are able to develop a better explanatory style and provide students with appropriate questioning, examples and paradigms. Given that many of the teachers involved in the current study were underqualified in mathematics and physical science, providing content knowledge together with pedagogical content knowledge was crucial.

It is vital, therefore, that teachers have the necessary mathematical expertise to improve student learning (Sood & Jitendra, 2007). Pedagogic practices

that motivate and inspire students not only foster improved academic standards in general, and mathematics standards in particular, but they may also help to address the issues of student attrition and dropout rates in high school associated with poor motivation. The current study which focused first on mathematics and then expanded to physical science and business studies, found these practical elements pivotal to success in the three curriculum areas.

Links to the current study

With the literature as discussed forming the backdrop, three elements were particularly pertinent to the current study: effects of poverty; under-qualified teachers with scant curriculum knowledge; and the enormous gains made by learners engaged in the initiative. Combined, these three elements worked to cut several heads off the Hydra simultaneously, which led to enhanced outcomes for learners from under-resourced schools. This is described next in this paper.

The Khanyisa (Lighting up learning) initiative

In an effort to counter inequities and ongoing lower achievement of learners in rural previously disadvantaged and currently still under-resourced schools, the Khanyisa (Lighting up learning) initiative started in 2009 when the changes from outcome-based education (OBE) to a national curriculum and assessment policy statement (CAPS) were under development. Teachers in a well-resourced, advantaged school situated in Pietermaritzburg KwaZulu-Natal, instituted a programme with several complementary components. The first iteration comprised a cohort of 20 teachers from previously disadvantaged schools (referred to as Khanyisa schools) in the rural areas beyond Pietermaritzburg who attended professional development sessions in mathematics at the advantaged school once every nine days to fit into the school timetable. These teachers are referred to as the Khanyisa teachers. The initiative provided the well-qualified teachers at the advantaged school with the opportunity to cover the whole curriculum, including new content within the CAPS curriculum as it became available, and to link it to pedagogical content knowledge. In the intervening days, Khanyisa teachers went back and put theory into practice and had the opportunity nine days later to share and discuss queries or problems they had encountered. That was six years ago.

At end of that first year of that two-year programme, Khanyisa teachers requested that revision lessons for their learners be provided by the Khanyisa project coordinator and facilitator. Funding was secured and direct teaching of Khanyisa learners by teachers in the advantaged school began and has continued in subsequent iterations of the programme. The initial revision sessions ran for one year on Saturdays and while improvement in learners' achievement was incremental, the project coordinator realised that if the learners could have two years of input, the improvement was likely to be more marked.

By the end of 2010, the project coordinator had forged a path with mathematics and consequently the programme was able—with additional funding—to be expanded to include business studies and physical science teaching sessions. With the expansion of the programme, Khanyisa learners come to the advantaged school for six out of nine Saturdays each term (two for each subject area) for two full years—their Grade 11 and 12 years. An unlooked-for advance has been the pupil-driven peer-tutor scheme. When there were insufficient Khanyisa teachers attending Saturday sessions to provide one-on-one assistance that learners needed, boys from the advantaged school committed to fulfil this role as peer tutors.

The researchers were looking for components of the Khanyisa programme that would lead to significant improvement in learners' achievement but that would benefit not only the students and teachers from the Khanyisa schools but also those from the advantaged school. These needed to be practical and sustainable considering details such as food and transport costs and sustained support from volunteers.

In order to have a comprehensive and insightful understanding of the findings in the current study, it is necessary to understand the context within which the current study took place.

Context of curriculum in the current study

In South Africa, between the release of Mandela in 1990 and 1994, laws allowing for racial integration of schools were promulgated, and such integration began to occur. The first free and fair elections in South Africa took place in 1994 with the African National Congress (ANC) becoming the ruling party. Major reconstructing followed. Schools were racially integrated by law, although many 'black' schools

remained 'black'. The disparity between 'black' and 'white' schools is highlighted by qualification of teaching staff. The number of secondary teachers teaching mathematics with no formal training in the subject was 68 per cent in contrast to 6 per cent in 'white' schools (Department of Education, 2001). The 19 different departments of education with different curricula were restructured to have nine provincial departments of education and one national department. The newly-formed National Education Department focused primarily on a more equitable redistribution of resources, the deracialisation of education, and the development of educational policy. The inequitable curricula had continued, however, and when the ANC took over in 1994, it felt compelled to move quickly to address the curriculum issue. A priority remained to maintain high standards in the previously advantaged (mostly 'white') schools and to bring previously-disadvantaged (mostly 'black') schools up to that level. Every effort was made not to allow all education to even out at the lower levels experienced in previously disadvantaged schools. Government therefore concluded it would be preferable—since it was effecting a complete overhaul of the education system—to implement OBE as the best way to accomplish this.

The ideal with the implementation of OBE in the form of *Curriculum 2005* (Department of Education, 1997) was to emancipate the majority of learners who had not been well-served in the past. It was posited that by introducing OBE, by 2005, "doors of opportunity may be opened for people whose academic or career paths have (previously) been blocked" (Van Wyk & Mothata, 1998, p. 4).

Outcomes-based education implementation challenges

Overcrowded classrooms and insufficient resources coupled with the dominant oral tradition of African culture meant that in practice extensive use was made by teachers in under-resourced schools of chanting, referred to by them as the choral method. This is the practice where the teacher provides the information to be learnt in short sentences or phrases which are repeated by the whole class, chanting the words until they can be repeated verbatim. Berry (2006) pointed out that inquiry learning pivotal to OBE was unlikely to occur "in classrooms where recitations are the norm and where the teacher and classroom texts are considered to hold the key to

knowledge” (p. 500). The choral method tended to lead to one type of learning only, seated in a transmission theory of education.

Soon after the implementation of OBE in 1997, the way it was implemented proved problematic. Jansen (1998) noted that the “language of OBE and its associated structures are simply too complex and inaccessible for most teachers to give these policies meaning through their classroom practice” (p. 323). This led to teachers’ self-efficacy being undermined as their curriculum content knowledge proved wanting—a key factor affecting learner achievement as discussed earlier (Anyon, 1980; Sharp, 2012).

Within the context of changes that were effected, as Cross, Mungadi and Rouhani (2002) pointed out, it was extremely difficult for new ideals to be realised because of the tensions inherent in any form of educational change. The ideals and philosophy need to be owned by the teachers in the classroom before there is any real change for students. Fullan (2003), notes that “most schools suffer from innovation overload” (p. 34) and that these innovations can collide. Nakabugo and Sieborger (2001) concurred, maintaining that many teachers found the paradigm shift to the post-apartheid Grade 1–9 OBE curriculum very challenging as there was insufficient training to see it satisfactorily implemented.

Other forces factored in as well. The World Bank, the International Monetary Fund (IMF) and the Swedish International Development Agency (SIDA) became players in South African politics. Newly elected leaders relied on IMF, SIDA and World Bank advice and the power dynamic in their relationships did not always see the ideals of the newly elected government come to fruition (Brock-Utne, 2000; Pape, 1998). An example of the “intellectual recolonisation of the African mind” (Brock-Utne, 2000, p. 8) was the carefully calculated control exerted by the monetary powers that enforced, for example, the use of the most cost-effective textbooks if their money was to be used. These were invariably books already in print. “Consequently, production by African publishers was limited. Furthermore, little cultural input or re-examination of local knowledge regarding the curriculum content was being promoted, and few mother-tongue texts were available” (Maher, 2007, p. 79). The focus within the OBE curriculum was predominantly Western in content and approach, having the effect that there

was a disjuncture for many ‘black’ learners, as described by Jindra (2014) and Healy and Powell (2013), leading to many finding it difficult to access the curriculum.

In summary, OBE “was a monumental failure” (Chisholm & Wildeman, 2013, p. 89), and it was officially abandoned in 2010, replaced with CAPS.

Changes in curriculum

One significant change over and above the move from OBE to CAPS, was a change to the mathematics curriculum which saw the introduction in 2004 of ‘mathematics literacy’ to meet the needs of learners entering secondary school with low levels of numeracy. Higher level mathematics, as opposed to mathematics literacy, leads to science, engineering and technology studies at tertiary level. The aims of the mathematics literacy curriculum are to promote the ability of learners to think quantitatively, to think spatially, and to use these skills in real life situations such as dealing with information in tables, graphs, diagrams and in text (Department of Education, 2003).

With the implementation of CAPS in 2010, the divide between mathematics and mathematics literacy became more entrenched, with the higher-level mathematics curriculum including elements not previously found in the OBE curriculum, such as Euclidian geometry and probability. Many of the under- or unqualified teaches in under-resourced schools had never studied these aspects during their own schooling nor during their teacher training. Following international trends, as highlighted by Fowler and Poetter (2004), what occurred in South Africa was a mass migration of learners from mathematics to mathematics literacy. Of half-a-million learners sitting the matriculation (exit examination) each year, in 2008 there were 300,000 enrolled in the higher level mathematics; by 2011 this had decreased by 25 per cent (Department of Basic Education, 2011).

The current study: Evaluation of the Khanyisa initiative

Methodology

There were several aims and areas of foci in the current evaluative study. The one reported in this paper is ascertaining to what extent the Khanyisa programme was meeting the needs of Khanyisa teachers and learners in the curriculum areas of mathematics, physical science and business studies.

The present research was a qualitative study in the paradigm of critical interpretivism which “takes the position that social and cultural phenomena emerge from the ways in which the actors in a setting construct meaning” (Schensul, 2012, pp. 75–76) but that this meaning is also related to the social and political context in which it occurs. Such research can uncover the implicit meaning, from one or more perspectives, in a particular circumstance. In the current study the “purpose [was] to understand the world or experience of another” (Ary, Jacobs, Sorensen & Walker, 2014).

This was an evaluative study and evaluation embeds the notion of judgement, whether one is referring to the subjective assessments people make informally during the course of their everyday lives, or whether one is referring to formal evaluation, such as specific inquiry. Cohen, Manion and Morrison (2011) note key features of evaluation: “answering specific, given questions; gathering information; making judgements and taking decisions” (p. 50). These authors note that educational evaluation is important in that it provides validation for improvements in educational policies and practices. In the current research, validation of practice and participants’ experience provided a platform for decision making in the schools where the research took place and in the wider context as well.

Ethical considerations

The evaluator, one of the authors of this paper, is an Australian academic who has historical links to KwaZulu-Natal, who speaks isiZulu and is conversant with the current context of education in South Africa. Ethics approval was gained from the academic’s university’s Human Research Ethics Committee as well as from the Khanyisa Board. The scope and focus of the evaluative study was collaboratively determined by the Khanyisa teachers, teachers from the advantaged school involved in the initiative, and principals of disadvantaged schools whose teachers and learners were involved in the Khanyisa initiative. Participants were all over the age of 18 and the evaluator spent time visiting Khanyisa schools so she was known to participant learners and teachers. All knew that their input would serve to inform improvements to the Khanyisa initiative; it would not benefit any of them in any way—only subsequent learners and teachers taking part in future iterations. They were eager to contribute.

Participants and methods

Overall there were 25 participants drawn from all stakeholder groups. These comprised Khanyisa learners ($n=18$) noted as KL1 to KL18 in transcripts, Khanyisa teachers ($n=2$) KT1 and KT2, peer tutors ($n=2$) PT1 and PT2, advantaged school facilitator ($n=1$) KF1, project coordinator and facilitator ($n=1$) PC, and a past peer tutor ($n=1$) PPT. Of these, 18 Khanyisa learners and two peer tutors took part in group interviews. The five adults took part in individual interviews. The Khanyisa Facebook site provided further data.

Findings and discussion

Learners from the rural Khanyisa schools encounter many disadvantages discussed in this paper which can negatively affect achievement: (a) they live in poverty (Montoya, 2014); (b) they experience cultural disjuncture with the curriculum (Jindra, 2014; Healey & Powell, 2013); (c) teaching practices frequently cause barriers to learning (Sharp, 2012); (d) teachers are under-qualified with superficial content knowledge (Stevens et al., 2013); (e) teachers’ self-efficacy is under siege with ongoing changes to curriculum leading to low motivation and expectations (Torff, 2014); (f) learning and teaching is not taking place in their home language (Aliakbari & Jamalvandi, 2010); and (g) physical resources are problematic with schools having no science laboratories and overcrowding prevalent in classrooms with frequently 80 or more learners crammed into a relatively small space (Collins & Millard, 2013).

In the following section, extensive use is made of participants’ own words. This is deliberate as it not only gives ‘voice’ to participants, it also provides excellent examples of the English levels of the Khanyisa learners and teachers, for whom English was a second, third, or fourth language.

Teacher confidence in mathematics

The interchange that follows between a Khanyisa teacher (KT1) and the researcher (R) illustrates several aspects discussed in the paper thus far.

R: How did you get involved in Khanyisa?

KT1: I was part of the first Khanyisa group of 20 teachers. I was selected. I don’t know how we were selected. I was attending in 2009. I was appointed as a maths teacher at school.

R: When you were first appointed, had you been teaching maths before?

- KT1: Eish! No. I had done a little bit maths at training college, but my maths knowledge, aibo! [disparaging exclamation] it was not good.
- R: How were you feeling about coming to the Khanyisa sessions?
- KT1: Scared. But I was empty. Because with maths, I am telling you, I was scared even to go to the class because I could not understand some of the chapters. Ja. So then I was involved here. We came every nine days. So we were going according to the syllabus. If we say we are going to teach THIS, then ... [project coordinator] is teaching us THIS so we can teach the children.
- R: And now when you come?
- KT1: Now I feel part of the family. We enjoyed it. We were 20 and we enjoyed here because even though [project coordinator] was teaching us we made groups of ourselves. So, if I tried to teach something at school and the kids didn't get it, then the next week when we had the Khanyisa time, I could ask the others how they had taught it and [project coordinator] could help as well with a different way.
- R: So was it like a community of learners?
- KT1: Yes a safe place where it is safe to say you don't know something.
- R: What has been most significant benefit to you?
- KT1: Khanyisa has developed me ever more. Sometimes if they are clever, the kids go ahead in the textbook and I used to think, what will I do? They will ask me something that I do not know the answer. Now, ja, now I am relaxed because there is every part of the syllabus that I know. And this year I have two A learners, they will get an A [distinction of 80+ per cent] I think. They got very good marks now with the trials [preliminary trial examination]. And I can tell you it is not because of me. It is because of Khanyisa.
- R: But it is because of you as well?
- KT1: Yes, but it is because of Khanyisa, now I am very clear in maths. It was like I never learnt the maths. I could not make the change to OBE now to the CAPS. I did not know the new parts of the syllabus because I never learnt it. But now I know every bit of it. And I help other learners from other schools. I have a group of matric learners who come from ...

schools [other schools in the area] and I help them, because I am just proud now to be a maths teacher. I am very proud. (Transcript 7)

Notable elements in this exchange are the teacher's previous lack of motivation, lack of confidence, lack of content knowledge, and reliance on the textbook. The effectiveness of teachers is linked not only to their beliefs but also to their knowledge of content matter and to their understanding of the concepts they teach (Stevens et al., 2013). A significant, positive relationship between teachers' mathematical knowledge and student achievement has been found (Hill, Rowan & Ball, 2005). Teachers with deeper understanding are able to develop a better explanatory style and provide students with appropriate questioning, examples and paradigms. Given that many of the teachers involved in the current study were underqualified in mathematics and physical science, providing content knowledge together with pedagogical content knowledge was crucial. Clearly the Khanyisa programme has rectified these aspects and additionally provided the pedagogical content knowledge required for teachers to be more effective as evidenced in improved learner achievement.

Learner confidence in Khanyisa subjects

The following excerpt demonstrates learners' increased confidence in Khanyisa subjects:

- R: How do you feel now, now you've come so often to Khanyisa?
- KL 4: Mmm. I could say that now I am quite, very confident. Ever since I have started and up until now and I have seen the changes in the tests we write, that we wrote at school ... and now I can even teach other children if, like, they ask me a question, I am able now to explain that understanding and it is not even, it is not just pretending [general laughter].
- KL6: Ja, we can really face the challenges in mathematics and physical science. 'Cos like before we were scared to, like, answer the questions, and now ja, now we can even talk to each other, from even ... we have met friends here, ja. And it is like very exciting, and even doing and writing a test—we get better marks than we were getting before.
- KL4: Sometimes even, if we do an old exam paper, then even, sometimes, my teacher at my school cannot know how to do it, and sometimes then I can help out also.

KL5: All I can say is that Khanyisa, it has been like a life-saver for us. It has been really good to us. It has helped us a lot. I am now even confident, like she said, to answer. I am now even excited to write my exam, but then, before, I was even like too scared to know what was going to come out. I was like a-shaking in my paper, but now I am just relaxed and just understand things, not just memorise things and write it down and hope it is the best thing to write, like before. (Transcript 2)

The 'killer subjects' slain

Khanyisa learners were extremely grateful for the opportunities that lay before them, with their increased grades in what they termed the 'killer subjects' of mathematics and physical science. This reference to the killer subjects was made several times by all participant groups, just the terminology differed somewhat. For the learners, the term 'killer subjects' captures well the difficulty they experience with them as reflected in the exit examination results, but also, poignantly, the end consequence if they do not do well in mathematics and science—a future killed off. Peer tutors referred to them as 'problem subjects' while facilitators and Khanyisa teachers referred to them as the 'gateway subjects' as they are indeed the gateway to further higher education study for all learners in South Africa.

While statistics reflect a decrease in the number of learners choosing mathematics as opposed to mathematics literacy (Department of Basic Education, 2011), with initiatives such as the Khanyisa programme, it will not be only learners from previously advantaged schools who can access the new curricula under CAPS, but also those from disadvantaged backgrounds.

Positives for Khanyisa learners

Positive outcomes noted by Khanyisa learners include their increased achievement percentages, their improved sense of self-efficacy, their capacity to now apply for scholarships for university study, vastly improved employment prospects, and the flow-on effect resulting in improvement in other curriculum areas because of their self-belief, increased motivation, and improved English literacy. Several of these elements are captured in the following exchange:

R: So, what do you want to do next year?

KL14: My first choice is medicine, second is pharmacy.

R: Where do you want to study?

KL14: I have applied to UKZN [University of KwaZulu-Natal].

KL15: My dream is to be an accountant. Before with my maths only 40, 50, I could not get in. Now, I am up in the high B [70–79 per cent] and sometimes A [80+ per cent] so I hope I will get in.

KL13: I want to go to teacher training college.

R: And do you think you will get in?

KL13: Yes, I have been accepted, last week. From Khanyisa my maths and physical science marks are good. But also, my English is much better now from Khanyisa. Here all the teaching is in English.

R: At your school, is the teaching also in English?

KL13: Yes, sometimes English, but a lot also isiZulu, most of the time. Now from Khanyisa my English is much better. Now if I read the textbook I can understand what is there. Before, I just tried to learn it off by heart, but I did not know what I was learning. So now, I am doing better in everything, not just maths and physical science. Now, I have got into the teacher training college. (Transcript 5)

As noted by Fowler and Poetter (2004), student's performance in secondary school leaving examinations has direct influence on their study and employment opportunities. As noted in the exchange above, these Khanyisa learners have brighter prospects than before the program thus countering the endemic disadvantage.

Goodwill fundamental to the Khanyisa programme

The first excerpt quoted previously, from an interview with a Khanyisa teacher, highlights the element of goodwill and the sense of responsibility she feels to assist wherever she can, even running sessions in the evenings for learners from other disadvantaged schools in her area. This wish to contribute is also evidenced by Khanyisa learners:

KL7: I am enjoying maths, now I am getting 90 per cent; before I was getting 30 and now 90.

KL9: I was getting 40, 50, but now it is much better, it is much better to share. I am the highest in my class, in distinction [80 per cent], so I also am helping my friends at school.

R: So you are teaching the other learners in your school what you have learned here at Khanyisa?

KL9: Ja, so I will get a distinction, but I am helping the others also to do better. So, at Khanyisa I can learn, but teach too. Because I am teaching the other learners at my school. Um, they can understand sometimes, but then some do not understand. So, then I must start again and think to find another way to say it. And I think it is the teaching that has made me to understand even better and I am so happy that I will do well, but it makes me more happy even that I can help some other people who did not come to Khanyisa. (Transcript 3)

This theme of the learners' understanding being so much better that they feel empowered to help other learners, pervaded most interviews. Khanyisa learners were deeply aware of what the opportunity to study at Khanyisa meant for them and their futures and the sense of obligation they felt to assist, back in their schools, learners who had not been provided this opportunity. The whole Khanyisa programme epitomises self-sacrifice: the project coordinator and other facilitators give of their time on Saturdays to undertake the Khanyisa teaching, over and above a heavy teaching load and co-curricular commitments within their school; learners from the advantaged school commit to giving up their Saturdays to act as peer tutors for the year; Khanyisa teachers contribute to peers and learners from other remote schools; and the Khanyisa learners' attendance was nearly 100 per cent.

Conclusion

Disadvantage and barriers to accessing the curriculum are the reality for many learners in KwaZulu-Natal. The Khanyisa programme addresses these challenges and has had positive outcomes on a number of levels.

As the curriculum has changed in South Africa to include aspects that were previously absent, the Khanyisa programme has been able to empower Khanyisa teachers to become confident in all aspects of the curriculum. At the same time, Khanyisa teachers have been provided with the requisite pedagogical content knowledge to more successfully teach disadvantaged learners in their under-resourced schools.

From the Khanyisa learners' perspective, their mathematics, physical science and business studies grades have improved substantially, leading to improved career prospects. As one learner (KL8) noted: "I am the first person in my family to go to Grade 12 and I will be the first person in my family

to go to the university. Then I can get a good job and we will not live any more in a zinc shack with no water."

The Khanyisa programme has severed several of the Hydra's 'disadvantage' heads most effectively. While a demonstrably successful model in its implementation, it is vulnerable on two fronts. Firstly, the programme relies on donations to fund learner and teacher attendance at the advantaged school so does not have long-term assurance in this regard; and secondly, it relies on the goodwill of staff and learners at the advantaged school to provide the teaching and peer tutoring who freely give of their time and expertise. This is laudable and reflective of much goodwill that exists in South Africa, but sustainability of the programme remains a concern.

The Khanyisa programme essentially developed from the vision and dedication of the project coordinator and has grown from there. Funders contribute financially; teachers contribute time and expertise to teach on Saturdays; schoolboys contribute their time and knowledge as peer tutors on Saturdays; and the advantaged school contributes venues for Khanyisa sessions. It is a highly successful programme. Long may it continue. The positives and challenges are presented here so that others from a position of advantage who may wish to make a wider contribution, could consider this model which has now been tried and tested in three iterations over six years.

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